(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号
特開2000－177281
（P2000－177281A）
(43)公開日　平成12年６月27日(2000.6.27)

(51)Int.Cl.⁷	識別記号	FI		テーマコード（参考）
B42D 15/10	501	B42D 15/10	501A	2C005
	541		541A	2H049
B41M 5/26		G02B 5/18		2H111
G02B 5/18		G03H 1/18		2H113
G03H 1/18		B41M 3/14		2K008

審査請求　未請求　請求項の数４　ＯＬ　（全８頁）　最終頁に続く

(21)出願番号　特願平10－354555

(22)出願日　平成10年12月14日(1998.12.14)

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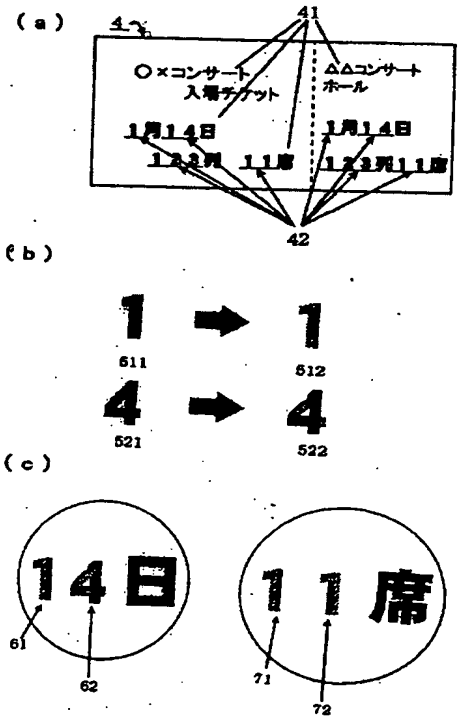
(54)【発明の名称】　ＯＶＤ画像付き入場券

(57)【要約】
【課題】装飾性に優れ、改竄、偽造防止対策が施された入場券を提供する。
【解決手段】可変印字部分４２の数記号等の一文字を複数の構成要素５１２、５２２に分解し、分解した構成要素に任意のＯＶＤ画像６１、６２、７１、７２を割り当て、ＯＶＤ画像を具備するＯＶＤ転写リボンを用いて転写・印字する。



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Kokai (Jpn. Unexamined Patent Publication) No. 2000-177281
Title of the Invention: Admission Ticket Having OVD Image
Publication Date: June 27, 2000
Patent Application No. 10-354555
Filing Date: December 14, 1998
Applicant: Toppan Printing Co., Ltd.
Inventors: T. Gyucho; N. Ito; A. Hayashi

[ABSTRACT]

Problem to be solved

The present invention provides a highly decorative admission ticket provided with a measure for preventing forgery or counterfeit.

Means for solving the problem

One letter, such as a numeral, at a variable printing area 42 is separated into plural constitutional elements 512 and 522. Optional OVD images 61, 62, 71 and 72 are assigned to the separated constitutional elements and the OVD images carried by an OVD transfer ribbon are transferred and printed.

[CLAIMS]

1. An admission ticket with OVD images, which is obtained by transferring and printing an OVD transfer ribbon having two or more OVD images and which has OVD images at variable printing areas.

2. The admission ticket with OVD images according to claim 1, which is obtained by separating one letter, such as a numeral or a symbol at variable printing areas into plural constitutional elements and providing the separated elements with optional OVD

images.

3. The admission ticket with OVD images according to claim 1 or 2, in which the OVD images are formed in the form of a plurality of holograms or diffraction gratings.

4. The admission ticket according to claim 1, 2 or 3, in which the OVD images are constituted by a plurality of multi-layers of deposited films.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Technical Field to Which the Invention Pertains]

The present invention relates to an admission ticket in which variable printing areas, i. e., areas for different information in each ticket, such as dates and seat numbers are heated and printed by a heating means such as a thermal head. Particularly, the present invention relates to an admission ticket, which is provided with a measure for forgery prevention.

[0002]

[Prior Art]

Admission tickets have different dates and sheet numbers. There are problems that the numerals or symbols can be altered by re-papering or re-pasting.

[0003]

Countermeasures against such unlawful conduct have been proposed. Proposals include a method in which the inner fiber parts of paper substrates for admission tickets are sufficiently dyed; a method in which printing-adhesive layers are provided such that printed characters are strongly adhered to the paper substrates, whereby the paper substrate surfaces are broken when tampered or forged; and a method in which a thermally-colored

layer provided on a printing surface is colored simultaneously with the printing of the numerals or symbols with a transfer ribbon by a thermal transfer method, whereby tampering is prevented because even if the portions printed by the transfer ribbon are removed, the portion under the removed portion is colored.

[0004]

[Problems to be Solved by the Invention]

The present invention provides a highly decorative admission ticket produced by a method different from conventional forgery preventing means.

[0005]

[Means for Solving the Problems]

The present invention disclosed in claim 1 is an admission ticket with OVD images, which is obtained by transferring and printing an OVD transfer ribbon having two or more OVD images and which has OVD images at variable printing areas.

[0006]

The invention disclosed in claim 2 is the admission ticket with OVD images according to claim 1, which is obtained by separating one letter, such as a numeral or symbol into plural constitutional elements and providing the separated elements with optional OVD images.

[0007]

The invention disclosed in claim 3 is the admission ticket with OVD images according to claim 1 or 2, in which the OVD images are formed in the form of a plurality of holograms or diffraction gratings.

[0008]

The invention disclosed in claim 4 is the admission ticket according to claim 1, 2 or 3, in which the OVD images are

constituted by a plurality of multi-layers of deposited films.

[0009]

The word "OVD" described in this specification is an abbreviation of an Optical Variable Device. An OVD indicates those which differ in image, color tone and the like depending on the viewing angle, position, etc.

[0010]

The OVD include a hologram or diffraction grating capable of representing three-dimensional images or special decorative images. They have a grating structure of a fine projection pattern or a vertical stripe pattern having a different refractive index. Because highly advanced technology is required to produce a hologram which can be processed to a sheet form, the hologram is pasted to credit cards, bonds or certificates, as means against counterfeiting.

[0011]

The hologram image has been produced by a conventional method. The method comprises preparing a relief-type master hologram of fine projections by an optical photographic projection method; preparing a nickel press mold having duplicated projection patterns from the master by an electric plating method; heating and pressing the same pattern to produce a large number of hologram images; and bonding the images onto the hologram-forming layer. The hologram of this type is called a relief-type hologram.

[0012]

Different from the above-described hologram image, diffraction grating images such as grating images and pixelgrams have pixels in fine area in a form of a plurality of simple diffraction gratings to represent an image. Such a diffraction

grating image can be mass-produced and the produced images are bonded to credit cards, bonds and certificates as forgery prevention means.

[0013]

The present invention relates to an admission ticket with OVD images. The ticket is produced by preparing a transfer sheet or transfer ribbon on which the OVD images are formed as forgery preventive means, and printing the OVD images by a printer capable of transferring and printing by a normal color transfer ribbon.

[0014]

[Mode of Operation of the Invention]

The mode of operation of the invention is explained with reference to drawings.

Fig. 1 is a plan view showing an example of the structure of an OVD transfer ribbon of the present invention. The OVD transfer ribbon 11 has plural elements 12 of OVD images. Elements 12 of OVD images include a plurality of simple diffraction gratings having different diffraction orientations and spatial frequency, diffraction grating images, rainbow hologram images, 3D hologram images and combination thereof.

[0015]

As the number of the variety of elements (12) of OVD images increases, the number of colors of the OVD images constituted thereby increases, whereby OVD images having highly decorative patterns can be obtained. However, three to twelve colors or patterns are preferable in view of the time required for printing.

[0016]

Registered marks 13 must be formed with diffraction gratings, holograms, etching patterns or by printing, to control a feeding mechanism of the OVD transfer ribbon 11.

[0017]

Fig. 2 is a cross-sectional view of a constitutional example of a transfer ribbon of the present invention. A release layer 22 is formed on substrate 21 as a support. An OVD layer is formed on the release layer 21.

[0018]

A back coat layer 25 is formed on the back of the substrate 21.i.e., the face opposite to that the release layer 22 is formed.

[0019]

The OVD layer 23 comprises a relief forming layer 231 having an OVD pattern formed on the face opposite to the release layer 22 and a reflective thin layer 232 deposited or sputtered to the surface of the OVD relief pattern.

[0020]

The OVD relief pattern can be formed by a conventional method. For example, it can be formed by heat-pressing a nickel-made mold having an OVD relief pattern comprising minute depression and projection patterns to the relief forming layer 231.

[00 21]

An adhesive layer 24 is formed on the reflective thin layer 232.

[00 22]

According to this example, a relief type OVD is explained as the OVD layer 23. A volumetric hologram may be used. It is preferable, however, to use the relief type OVD because it can be mass-produced resulting in saving cost, and can be formed to be a thin film.

[00 23]

The substrate 21, a film support, can be a generally transparent polyethylene terephthalate film. Other preferred

materials are one or a composite of a synthetic resin such as polyvinyl chloride, polyester, polycarbonate, polymethacrylic acid methyl and polystyrene, a natural resin, paper and a synthetic paper. The substrate may have any thickness. Generally, if workability is important, the substrate should be thicker, while if printing sensitivity is more important, the substrate should be thinner. In order to satisfy the requirements for both, the substrate is preferred to have a 10 to 20μm thickness.

[0024]

The release layer 22 is provided to effectively transfer the relief forming layer 231 to ticket sheet. Preferable materials for the layer 22 include a thermo-plastic resin, chloride rubber resin, vinyl chloride-vinyl acetate copolymer resin, cellulose resin, chlorinated polypropylene resin, polyester resin or any of these resins to which is added a silicon oil, aliphatic acid amide, zinc stearate or other inorganic substance.

[00 25]

The relief-forming layer 231 should be excellent in embossing capability, and should not produce surface irregularities at pressing. Further, it should show good adhesion to the release layer 22 and to the reflective thin layer 232. Typical examples of the material for the relief forming layer include a thermo-plastic resin such as a polycarbonate resin, polystyrene resin and polyvinyl chloride resin; a thermo-setting resin such as an unsaturated polyester resin, melamine resin, epoxy resin, urethane (meth)acrylate, polyester(meth)acrylate, epoxy(meth)acrylate, polyol(meth9acrylate, melamine(meth)acrylate and triazine(meth)acrylate or their mixture; and a thermo-forming material having a radically

polymerizing, unsaturated group.

[00 26]

The OVD relief pattern is formed by pressing a mold having an OVD relief pattern heated to 100 to 200 ° C to the relief forming layer 231 under pressure.

[00 27]

The reflective thin layer 232 reflects light, and comprises a substance having metallic reflectivity, such as Al, Au, Ag and Cu. The layer 232 can be produced by a film-making process such as a vacuum deposition, sputtering or ion-plating method. The film is preferred to have 10 to 1,100 nm thickness.

[00 28]

The reflective thin layer 232 can be produced also from a transparent material with a high refraction index having a reflective property and permeability. That is, it can be produced from a material which has a higher refraction index than that of the relief forming layer 231 (refraction index n=1.3 to 1.5) and which is transparent. Examples of such inorganic material are shown in Table 1.

[0029]

Table 1

Material	Refraction Index(n)	Material	Refraction Index(n)
Sb_2S_3	3.0	SiO	2.0
Fe_2O_3	2.7	Si_2O_3	2.5
TiO_2	2.6	In_2O_3	2.0
CdS	2.6	PbO	2.6
CeO_2	2.3	Ta_2O_3	2.4
ZnS	2.3	ZnO	2.1

PbCl	2.3	ZrO_2	2.0
CdO	2.2	Cd_2O_3	1.8
Sb_2O_3	2.0	Al_2O_3	1.6
WO_3	2.0		

[0030]

The adhesive layer 24 may be one conventionally used, which does not degrade or corrode the reflective thin layer 232. For example, vinyl chloride acetate adhesive, acrylic adhesive or polyester adhesive can be used.

[0031]

The back-coat layer 25 formed on the back side of the substrate 21, i.e., the side opposite to the release layer 22 with respect to the substrate 21, prevents the transfer sheet from sticking at a transfer step and from adhering to the thermal head. The back-coat layer 25 may be of any structure, which can prevent the transfer sheet (transfer ribbon) from adhering to the thermal head. Examples of the binder include a thermoplastic acrylic resin, a cellulose resin, a polyester resin and a silicon thermosetting EB resin. A variety of surfactant as a slipping agent, a polyethylene wax and a silicon wax as a lubricant and talc as filler may be added.

[0032]

Fig. 3 is a constitutional cross-sectional view of another transfer ribbon having a multi-layered OVD layer of the present invention. The materials and the constitution of the ribbon are same as those of Fig. 2 except that the OVD layer has a different structure.

[0033]

Colors with different color tones can be observed by varying the film thickness of materials having different reflective index

and the numbers of the layer to be laminated. An example is a laminate having a predetermined film thickness, which comprises a high-reflective material having a reflective, index of 2 or higher and a low-reflective material having a reflective index of about 1.5. Specific examples therefor include ceramic such as Sb_2S_3 (n=3.0), Fe_2O_3 (n=2.7), TiO_2 (n=2.6), CdS (n=2.6), CeO_2 (n=2.3), ZnS (n=2.3), Sb_2O_3 (n=2.0), WO_3 (n=2.0), SiO (n=2.0), Si_2O_3 (n=2.5), In_2O_3 (n=2.0), PbO (n=2.6), ZnO (n=2.1), ZrO_2 (n=2.0), MgO (n=1.6), SiO_2 (n=1.5), MgF_2 (n=1.4), CaF_2 (n=1.3 to 1.4), AlF_3 (n=1.6), Al_2O_3 (n=1.6); plastics such as polyethylene (n=1.51), polypropylene (n=1.49), polytetrafluoroethylene (n=1.35), polymethylmethacrylate (n=1.49) and polystyrene (n=1.60).

[0034]

At least one of these high-reflective materials and thin metallic films having a transmittance of about 30 to 60 %, and at least one of low-reflective materials are selected and alternatively laminated in a predetermined thickness. A specific wavelength can be thereby absorbed or reflected.

[0035]

A multi-layered thin film is formed from the above-mentioned materials, selected based on optical properties such as reflective index, reflection coefficient and transmittance, wear-resistance, chemical resistance and adhesion property between layers. The forming method can be any conventional method including a normal vacuum deposition method by which the film thickness and the film forming speed can be controlled; a physical vapor deposition method such as general vapor deposition and sputtering, and a chemical vapor deposition method such as a CCD method can be adopted. The method for forming a low-reflective plastic film includes various printing methods such as photogravure printing, off-set printing and screen printing, and coating methods such as a bar coating method and a roll coating method.

[0036]

Fig. 4 is a schematic view showing a printing structure of variable numerals on an admission ticket of the present invention. In Fig. 4, a reference (a) shows a plan view of the admission ticket; (b) is a view showing a plurality of separated constitutional elements of one letter; (c) is a view explaining that an OVD image is assigned to each of the constitutional

elements.

[0037]

The admission ticket 4 comprises regular printing areas 41 and variable printing areas 42. By normal printing step, numerals 511, 512 in the variable printing areas have been printed conventionally in simple black. According to the invention, numbers 511, 512 in the variable printing areas are separated, for each of the numerals, into detailed constitutional elements. By separating the numeral into constitutional elements and assigning each OVD image to respective element, highly decorative and counterfeit preventing effects are realized. When same numerals, 1 in the drawings, are used with different digits, such as 1 at the units digit and at the tens digit, the elements structure may be varied whereby counterfeiting or forgery becomes still more difficult.

[0038]

Fig. 5 is a block diagram showing a structural example of a system for preparing an admission ticket of the present invention. The system for preparing an admission ticket comprises a letter-inputting device 81, an image data converting device 82, and output device 83 for transferring and printing OVD images. The letter-inputting device 81 may be a keyboard by which variable letters are put into the image data-converting device 82. By the device 82, the letter information is separated to constitutional elements. Further, it is decided as to which OVD image is assigned to any of the separated constitutional elements and the results are prepared in a form of a color separation file.

This method is same as that for printing a color image using a normal color transfer ribbons, and uses an OVD transfer ribbon in place of the color transfer ribbon. A normal printing thermal

head, such as a thermal head and a laser drawing head, may be used as the output device 83 for transferring and printing OVD images.

[0039]

[Example 1]

An OVD ribbon shown in Figs. 1 and 2 is prepared by the following method.

A release layer 22 was prepared using a photogravure method. First, a release layer forming paint was coated onto a substrate 40 of transparent polyethylene terephthalate (PET) film having a thickness of 12 μm at a dry temperature of 110° C to have a coating thickness of 0.8 μm to form the release layer 22. A relief forming paint was coated on the release layer 22 by a photogravure method at a dry temperature of 110° C to have a thickness of 0.5 μm to obtain a relief forming original layer (not shown).

[0040]

A nickel mold having elements of OVD images was used to form OVD relief patterns on the relief-forming layer 231. The mold has OVD relief patterns of an element OVD image pattern R 121, an element OVD image pattern Y 122, an element OVD image pattern G 123, an element OVD image pattern B 124 and registered marks 13. The mold was heated to 165° C and was pressed on the relief-forming layer 231 by a conventional roll-embossing method to form OVD relief patterns on the layer 231.

[0041]

Diffraction gratings by EB sketching were used for element OVD images 12. That is, for the element OVD image R pattern121, it is used a diffraction grating having a spatial frequency of 1,140 line/mm, which exhibits red color (wavelength: 620 nm), observed when illuminated from the grating direction of 45 degrees,

with the grating direction of -21 degrees right downward. For the element OVD image Y pattern122, it is used a diffraction grating having a spatial frequency of 1,240 line/mm, which exhibits yellow color (wavelength: 570 nm), observed when illuminated from the grating direction of 45 degrees, with the grating direction of -7 degrees right downward. For the element OVD image G pattern123, it is used a diffraction grating having a spatial frequency of 1,390 line/mm, which exhibits green color (wavelength: 510 nm), observed when illuminated from the grating direction of 45 degrees, with the grating direction of +7 degrees right upward. For the element OVD image B pattern124, it is used a diffraction grating having a spatial frequency of 1,540 line/mm, which exhibits yellow color (wavelength: 460 nm), observed when illuminated from the grating direction of 45 degrees, with the grating direction of +21 degrees right downward.

[0042]

Then, a reflective thin layer 232 was formed by a vapor deposition method by depositing an Al layer having a thickness of 0.05 μm onto the relief forming layer 231 on which the OVD relief patters were formed. On the reflective thin layer 232, an adhesive layer 24 was formed by a photogravure method by coating materials for the adhesive layer onto the layer 232 at a dry temperature of 110° C to a thickness of 0.5 μm. Finally, a back-coat layer 25 was formed by a photogravure method. Materials for the back-coat layer were coated onto the back side of the substrate 21 as a support, i.e., the side opposite to the side on which the release layer 22 was formed, at a dry temperature 110° C to a thickness of 0.7 μm.

[0025]

The coating materials for producing the OVD transfer sheet are described below.

(materials for the release layer)

acrylic resin	30 parts
polyester resin	5 parts
toluene	40 parts
methyl ethyl ketone	40 parts
methyl isobutyl ketone	20 parts

(materials for the relief forming layer)

copolymer of vinyl chloride and vinyl acetate	25 parts
urethane resin	10 parts
methyl ethyl ketone	50 parts
toluene	50 parts

(The coating material for the adhesive layer)

copolymer of vinyl chloride and vinyl acetate	30 parts
polyester resin	20 parts
methyl ethyl ketone	50 parts
toluene	50 parts

(materials for the back-coat layer)

vinyl resin	50 parts
isocyanate hardening agent	5 parts
silicon wax	1 part
methyl ethyl ketone	50 parts
toluene	50 parts

[0044]

The OVD transfer ribbons prepared by the method mentioned above were used to transfer and print the OVD image patterns assigned to variable numeral area of admission tickets, whereby

to produce the tickets.

[0045]

[Example 2]

OVD transfer ribbons shown in Figs. 1 and 3 were prepared by the following method. The substrate 31, the release layer 32, the adhesive layer 34 and the back-coat layer 35 of these ribbons are same as those of Example 1, and are not explained.

[0046]

The OVD layer or multi-film layer 33 was formed by depositing Al on the release layer 32 by a vapor deposition method in a thickness of 20 nm. SiO_2 was deposited as a low-reflective layer by vapor deposition to have a thickness required to the color for respective element of the OVD images. Al was further deposited thereon by vapor deposition to a thickness of 60 nm.

[0047]

SiO_2 was used to form a film having a thickness below for each of the following elements of the OVD images:

413 nm for the OVD element image pattern R (121)

380 nm for the OVD element image pattern Y (122)

340 nm for the OVD element image pattern G (123), and

413 nm for the OVD element image pattern B (124).

[0048]

When the thickness is adjusted as above, the color of the pattern viewed from front-side is red, yellow, green and blue, respectively, for the OVD element image pattern R (121), the OVD element image pattern Y (122), the OVD element image pattern G (123) and the OVD element image pattern B (124).

[0049]

The OVD transfer ribbons prepared by the method mentioned above were used to transfer and print the OVD image patterns

assigned to variable numeral area of admission tickets, whereby to produce the tickets.

[0050]

[Technical Advantage of the Invention]

Conventionally, numerals at a variable printing area were printed simply in black. According to the invention, numerals in the variable printing areas are separated into constitutional elements and a variety of OVD images are assigned thereto. By assigning each OVD image to a respective element, highly decorative and counterfeit preventing effects for admission tickets are realized. When same numerals are used with different digits, such as a numeral at the units digit and that at the tens digit, the elements structure may be varied whereby counterfeiting or forgery by re-pasting, etc. becomes still more difficult.

[Brief Description of the Drawings]

Fig. 1 is a plan view of a structural example of an OVD transfer ribbon according to the invention.

Fig. 2 is a cross-sectional view of a structural example of an OVD transfer ribbon according to the invention.

Fig. 3 is a cross-sectional view of another structural example of an OVD transfer ribbon according to the invention.

Fig. 4 is a schematic view showing a numeral structure at variable area on an admission ticket of the present invention, wherein

(a) shows a plan view of the admission ticket;

(b) shows a view showing a plurality of separated elements of one letter;

(c) shows a view explaining that an OVD image is assigned

to each of the separated, constitutional elements.

Fig. 5 shows a block diagram of a structural example of the admission ticket producing system of the invention.

[Explanation of Numerical References]

11 ...OVD transfer ribbon
12...OVD element image
121...OVD element image pattern R
122...OVD element image pattern Y
123...OVD element image pattern G
124...OVD element image pattern B
13...register mark
131...R register mark
132...Y register mark
133...G register mark
134...B register mark
21...substrate
22...release layer
231...relief forming layer
232...reflective thin layer
24...adhesive layer
25...back-coat layer
31...substrate
32...release layer
33...OVD layer or multi-film layer
34...adhesive layer
35...back-coat layer
4...admission ticket
41...regular printing area
42...variable printing area

511 and 521...numerals at variable printing areas

512 and 522...numerals separated to a plurality of constitutional elements at variable printing areas

61, 62, 71 and 72...enlarged numerals at variable printing areas

81...letter inputting device

82...image data converting device

82a..means for separating a letter into constitutional elements

82b..means for assigning OVD images

82c...color separation file

83...output device

Fig. 5

81...letter inputting device

82...image data converting device

82a..means for separating a letter into constitutional elements

82b..means for assigning OVD images

82c...color separation file